REMARKS

The specification and drawings have been amended as requested.

Claims 1-12 have been replaced with claims 13-28 herein. In general[1], claim13 includes features of original claims 1, 9, 10; claims 14 and 15 include features of original claim 11; claim 16 includes features of original claim 3; claim 17 includes features of original claims 4 and 12; claim 18 includes features of original claim 5; claims 19 and 20 include features of original claim 6; claims 21 and 22 include features of original claim 7; claims 23-25 include features of original claim 8; claim 26 includes features of original claim 9, and claims 27 and 28 include features of original claim 10.

The new claims do not include the language noted in the rejection under 35 USC 112, second paragraph, and are submitted to fully comply with that section.

New claims 13-28 include independent claims 13, 27 and 28 and dependent claims 14-26.

Independent claims 13, 27 and 28 are directed to a light source arrangement that includes a radiation source that emits radiation from the wavelength range 400 to 500 nm (claims 13 and 28) or 430 to 480 nm (claim 27) of the spectrum, and a mixture of luminescent materials arranged to receive the radiation and at least partially convert the radiation into longer-wave radiation. In claims 13 and 27, at least one luminescent material in the mixture has a Ce-activated garnet structure having the formula $A_3B_5O_{12}$, in which the first component A contains at least one element from the group consisting of Y, Lu, Se, La, Gd, and Sm and the second component B contains at least one element from the group consisting of Al, Ga and In. In claims 13, 27 and 28, at least one other luminescent material in the mixture contains a Ce-activated garnet structure having the formula $A_3B_5O_{12}$, in which the first component A contains at least one element from the group consisting of Y, Lu, Se, La, Gd, Sm and Tb and consists at least in part of Tb as a constituent of the host lattice, and the second component B contains at least one element from the group consisting of Al, Ga and In. Claims 13, 27 and 28 are explicit that Tb is

[1] The new claims may not include all features of the original claims.

a constituent of the host lattice. As is noted in the specification at page 2, line 25 to page 3, line 6:

> Particularly worth noting in this regard is the fact that terbium (Tb), when excited in the spectral region between about 400 and 500 nm as a constituent of the host lattice, i.e., the first component A of the garnet, is suitable for use as a yellow-emitting luminescent material whose dopant is cerium. Terbium has previously been proposed in addition to cerium as an activator for emission in the green region of the spectrum. It is possible to use terbium as the principal constituent of the first component A of the garnet, alone or in combination with at least one of the other rare-earth metals proposed hereinabove. (Emphasis added).

As noted in the specification at page 4, line 24 to page 5, line 3:

> In general, relatively small amounts of Tb in the host lattice primarily serve the purpose of improving the properties of known cerium-activated luminescent materials, while larger amounts of Tb can be added specifically to shift the emission wavelength of known cerium-activated luminescent materials. A high proportion of Tb is therefore especially well suited for white LEDs with a low color temperature of less than 5000K. (Emphasis added).

As shown in Fig. 1 and described in the application at pages 5-7, by mixing a YAG with Tb as a constituent of the host lattice component A with another YAG that does not have Tb as a host lattice constituent, one can change the color locus lines to a desired position.

Original claim 1 was rejected as anticipated by Berkstresser U.S. Patent No. 4,550,256. In the office action, it was stated that Berkstresser disclosed a luminescent material with "a Ce-activated garnet (YAG:Ce) structure $A_3B_5O_{12}$ in which the first component A is Y and Tb....[citing col. 3, line 62]." (This statement about Tb being the first component A is in error, as is explained in detail below.)

Shimizu et al. U.S. Patent No. 5,998,925 was cited against claim 3 for teaching "that the phosphor may contain two or more yttrium-aluminum garnet fluorescent materials of different composition."

Butterworth U.S. Patent No. 5,847,507 was cited against claims 9-11 for disclosing a device that used YAG:Ce luminescent material to partially convert the radiation from a blue radiation source to a longer wavelength.

Berkstresser does not teach using Tb as a constituent of the host lattice, as claimed in claims 13, 27 and 28 herein. Berkstresser instead teaches the use of Tb as a sensitizer (see Abstract), i.e., a dopant that "absorbs energy from the exciting means and transfers part of the energy to the activator, with the reverse energy transfer being small "(see col. 2, lines 3-17). A dopant is an impurity, i.e. it is not part of the matrix lattice (YAG) as such, which is why the nomenclature Ce:Tb:YAG is used (e.g., col. 4, lines 32-35). In the present patent application, Tb is neither used as a sensitizer nor as an activator in the way Berkstresser teaches but it functions as a main component of the host crystal, i.e., it is main part of the matrix lattice $A_3B_5O_{12}$. In the passage of the specification quoted above, the prior art use of Tb as an activator (like Berkstresser) was distinguished from the use of Tb as a constituent of the host lattice.

Berkstresser also does not teach a radiation source from the range 400 to 500 nm. Instead, Berkstresser teaches that his visual display device contains an excitation beam source that emits electron beams or electromagnetic radiation beams in the UV (Col. 6, lines 33-36, col. 7, lines 48-51).

Berkstresser also does not teach a mixture of luminescent materials as claimed, but instead is limited to "single crystal material" and "single crystal layers" as noted in the Abstract and throughout the specification.

Berkstresser cannot be properly combined with Shimizu, which was cited for disclosure of a phosphor with two or more YAGs. Berkstresser refers to "single crystal Ce:Tb:YAG"(see col. 4, lines 32-35) and points out that the "Tb-sensitization manifests itself also in increased emission time, as compared to prior art single crystal Ce:YAG and powder Ce:Tb:YAG" (Col. 4, lines 42-45). Plural single crystals cannot be mixed with each other. Thus, the disclosure of Berkstresser cannot be combined with the disclosure of Shimizu et al. and it would not have been obvious at all to one of ordinary skill in the art at the time the invention was made to use a mixture of luminescent materials containing both garnets YAG: Ce and YAG: Ce: Tb. This is strengthened by the fact that Berkstresser teaches that the chromaticity of the emission can be changed by "doping Ce:Tb:YAG with one or more rare earths" (col. 6, lines 20-22) which basically is a different approach than using a mixture of luminescent materials.

Berkstresser also cannot be combined with Butterworth. These references involve different types of materials and different types of radiation sources and arrangements. As already

mentioned, Berkstresser refers to "single crystal Ce:Tb:YAG" (see col. 4, lines 32-35) and plural single crystals cannot be mixed with each other. Butterworth, on the other hand, refers to adding fluorescent dyes or powders to a lens material, and it would not have been obvious to use Berkstresser's single crystal in place of the Butterworth dyes or powders. Also, the material disclosed by Berkstresser is taught to be excitable by light from the UV region, while Butterworth refers to material excitable by LED light of a wavelength from the blue spectral region (see column 3, lines 36 to 64, and column 2, lines 6 to 16). Consequently, it does not make sense combine to Berkstresser's single crystal Ce:Tb:YAG with Butterworth's arrangement comprising a blue light emitting LED and a fluorescent material being excitable by this blue light and being mixed into epoxy of the LED lens.

Even if, contrary to fact and law, Shimizu and Butterworth are combined with Berkstresser to end up with a radiation source from the range 400 to 500 nm and a mixture of luminescent materials, there still is absolutely no inkling in any of the references of a luminescent material of the formula in which "Tb is a constituent of the host lattice" as required by claims 13, 27 and 28.

Accordingly the subject matters of independent claims 13, 27 and 28 are not disclosed in or suggested by the cited references, taken alone or in combination, and claims 13, 27 and 28 are patentable under 35 USC 102 and 103(a). The remaining claims depend on claim 13 and are allowable with it.

Attached is a marked-up version of the changes being made by the current amendment. Applicant asks that all claims be allowed. Enclosed is a $334 check for excess claim fees. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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Version with markings to show changes made

In the specification:

Paragraph beginning at page 2, line 18 has been deleted as follows:

[The invention attains this object by means of the features of Claim 1 and the features of Claims 4 and 9. Advantageous improvements and refinements of the invention are set forth in the dependent claims.]

Heading beginning at page 13, line 1 has been amended as follows:

[Abstract] -- ABSTRACT OF THE DISCLOSURE --

In the claims:

Claims 1-12 have been cancelled.

In the drawings:

Figures 1 and 2 have been amended as indicated in red on the enclosed sheet of drawings to delete "Ersatzblatt (Regel 26)".